Operations

GROUND TEAMS IN MISSING AIRCRAFT SEARCH

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**   (LtCol Gerald Krueger)**

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This staff paper proposes methods for employing CAP ground teams on missing aircraft searches. This paper is neither official policy nor doctrine. The paper is an input to the policy and/or doctrine generation process.

SUMMARY OF REVISIONS

This is the first publication of this document.

AUTHOR

LtCol Michael A. Curry, CAP

CONTENTS

1.   **Background**
        The CAP search and rescue manager must effectively employ all available
        resources to achieve a successful outcome in a minimum time and at a minimum
        acceptable risk. Effective employment means using each resource in a manner
        that best contributes to mission success. The manner of employment varies by
        type of resource, mission conditions, and phase of the search and rescue operation.
        This paper focuses on employing CAP ground teams throughout all phases of a
        missing aircraft search and rescue operation.

2.   **Mission Models, Phases, and Stages**
        The use of ground teams will vary with the type of mission (or "mission model"),
        the point to which the mission has progressed (phase), and, often, how far into the
        search phase (stage) the mission has moved. Realizing this, the paper will define
        two mission models and examine the use of ground teams in each applicable
        mission phase and search stage.

        2.1.   First Mission Model - Type I Missing Aircraft Search. This paper defines
                a Type I Missing Aircraft Search as one in which the subject aircraft's
                route of intended flight is known, the distance from the last known
                position (LKP) to the point of first intended landing (PFL) is greater than
                15 nm but less than 200 nm, and there are no SARSAT targets within the
                search area. The model also assumes there was no MAYDAY call in
                which the aircraft's location was fixed, and there are no known mitigating
                factors that would cause the search manager to believe the subject aircraft
                is outside of a search area that can be defined using current statistical
                methods (NPOAM, CSAD, Minimax, etc.).

        2.2.   Second Mission Model - Type II Missing Aircraft Search. This paper
                defines a Type II Missing Aircraft Search as one in which the subject
                aircraft's route of intended flight is known (or can be reasonably
                estimated), the distance from the last known position (LKP) to the point of
                first intended landing (PFL) is less than or equal to15 nm, and there are no
                SARSAT targets within the search area.

        2.3.   Mission Phases and Stages. This paper uses four distinct phases of a CAP
                missing aircraft search and rescue mission.
                2.3.1. Alert Phase. The Alert Phase begins when the CAP wing accepts a
                        search and rescue tasking and continues through three stages.
                             2.3.1.1.Call-up Stage. The Call-up Stage includes selecting and
                                  appointing an Incident Commander, alerting wing units and
                                  receiving availability reports.

2.3.1.2. Initial Staffing Stage. This is the stage in which the Incident Commander appoints the initial incident staff and selects a command post and mission base location.

2.3.1.3. Initial Planning Stage. The result of the Initial Planning Stage is the first Incident Action Plan (IAP).

2.3.2. Search Phase. It is in the Search Phase that most of the operational activity of the mission takes place. The planning process continues throughout this phase. The Search Phase can be divided into two stages.

2.3.2.1. Initial Search Stage. This stage includes the first visual and electronic searches as well as initial interviewing and investigation activities.

2.3.2.2. Intensive Search Stage. The Intensive Search Stage is characterized by a large number of relatively-high target POD searches over statistically significant areas. This stage also includes "lead checking" and continued interviewing and investigation.

2.3.3. Rescue and Recovery Phase. The Rescue and Recovery Phase begins when the missing aircraft is found and ends when all crash victims and survivors have been removed or evacuated from the crash site. This phase progresses through three stages.

2.3.3.1. Identification Stage. During this stage the subject aircraft is identified and all occupants are located and assessed.

2.3.3.2. Stabilization Stage. In the Stabilization Stage the crash site is secured and occupants are stabilized for evacuation.

2.3.3.3. Evacuation Stage. In this stage aircraft occupants are evacuated to the appropriate facilities.

2.3.4. Post-Recovery Phase. The Post-Recovery Phase takes the mission from aircraft occupant evacuation to final shut down. This phase has three stages.

2.3.4.1. Hand Off Stage. This stage involves turning over control of the crash site and occupants to appropriate civil authorities.

2.3.4.2. Demobilization Stage. The Demobilization Stage involves the orderly release of CAP resources and the tracking of those resources to their home bases.

2.3.4.3. Shut Down Stage. In this last stage, the Incident Commander and assigned staff complete all closing documentation, perform all necessary notifications, and close the mission with the appropriate agencies.

3.   Ground Team Uses
Although the capabilities of ground teams vary (hopefully slightly) from team to team, the search manager has a number of ways to employ ground teams on a missing aircraft search. In order of positive impact on missing aircraft search success these are:

3.1.   Interviewing. A ground team's most effective activity is gathering data that will limit the search area and decrease time-to-find.

3.2.   Ground Electronic Search - SARSAT. In missions in which there are SARSAT ELT data, electronic search is a ground team's best use.

3.3.   Aerial Sighting Verification. Even the best trained aircrews cannot confirm all sightings from the air. When given sighting coordinates or when guided in by aircraft, ground teams are the most effective means of determining whether an aerial sighting is the missing aircraft.

3.4.   Crash Site Operations. In general, CAP ground teams are the CAP resources trained to secure an aircraft crash site and stabilize the victims of a crash.

3.5.   Ground Visual Search. In cases in which there is a high probability that the missing aircraft is contained in a small area (NTAP data, fixed MAYDAY location, etc.) and ground cover makes air search difficult, ground teams can effectively perform visual search. Until the search area has been narrowed to a reasonable size for ground search (typically 160 acres or less per team per search) ground visual search is ineffective.

3.6.   Ground Electronic Search - No SARSAT. Without SARSAT or airborne ELT reports, ground electronic search is a poor use for a ground team. However, in "unflyable" weather the ground team may be the only electronic search platform available.

3.7.   Support Operations. Ground teams can perform such support operations as providing communications relays and establishing camps and staging areas. If possible, ground teams should only be used as support resources for a limited time and be quickly replaced with dedicated support personnel.

4. **Ground Team Employment**

4.1. <u>Search Phase.</u> The Search Phase is usually the first phase in which ground teams are employed as operational resources. The method of employment varies mostly by mission type and slightly by search stage.

4.1.1. Type I Missing Aircraft Search. In Type I searches, ground teams are most effective as information gathering resources. Although information gathering remains the ground team's primary assignment throughout the search phase, other activities gain more importance as the search progresses.

4.1.1.1. Initial Search Stage. Since in the Initial Search Stage the general public has not yet been informed of CAP's search activities, ground teams are usually the only means the search manager has for gathering leads that will reduce the search area. An effective interviewing strategy is the "rule of halves". In employing this rule, the search manager seeks to successively divide the search area by halves, thus rapidly reducing the primary search area's size.

4.1.1.1.1. Figure 1 shows an example of this method. The example aircraft is missing on a flight from Boscobel Airport to Milwaukee Timmerman Field, a distance of 116 nautical miles. In this case the last known position is Boscoblel and the point of first intended landing is Milwaukee Timmerman. The search manager defines the first interviewing area (interviewing area 1) as a zone centered about a line perpendicular to the midpoint of the flight path from LKP to PFL and 15 nautical miles to either side of it. The width of the zone is chosen based upon the population density of the area. In Wisconsin, for statistically valid interviewing data, the zone should be three nautical miles wide for those areas with a population density of less than 20 people per square mile, and two nautical miles wide for all other areas (see figure 2). In this example, the zone is two nautical miles wide.

Figure 1
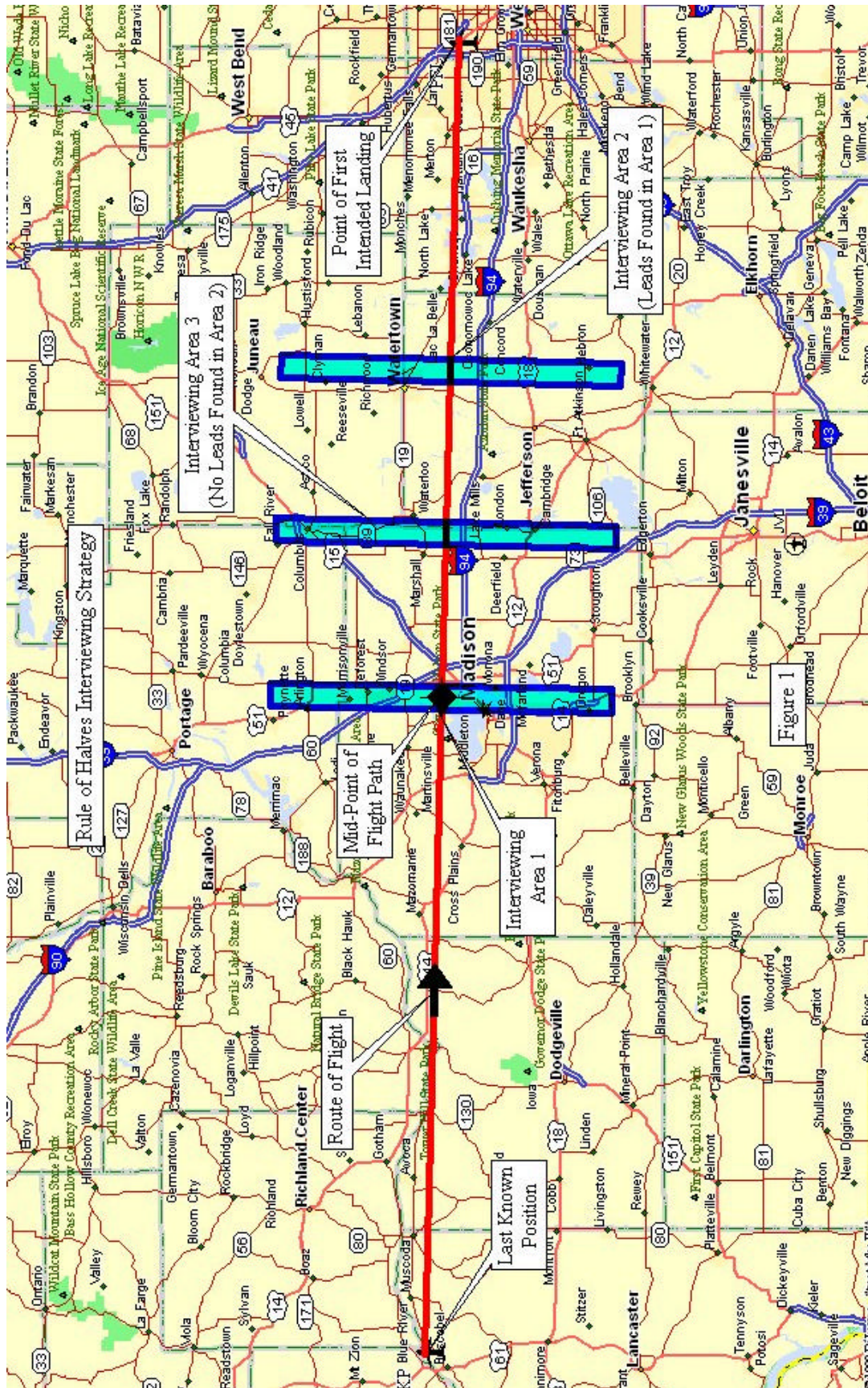
Estimated Population Density in Wisconsin, by Municipality, January 2000

State Estimated Density, 2000: 97.7 persons per square mile
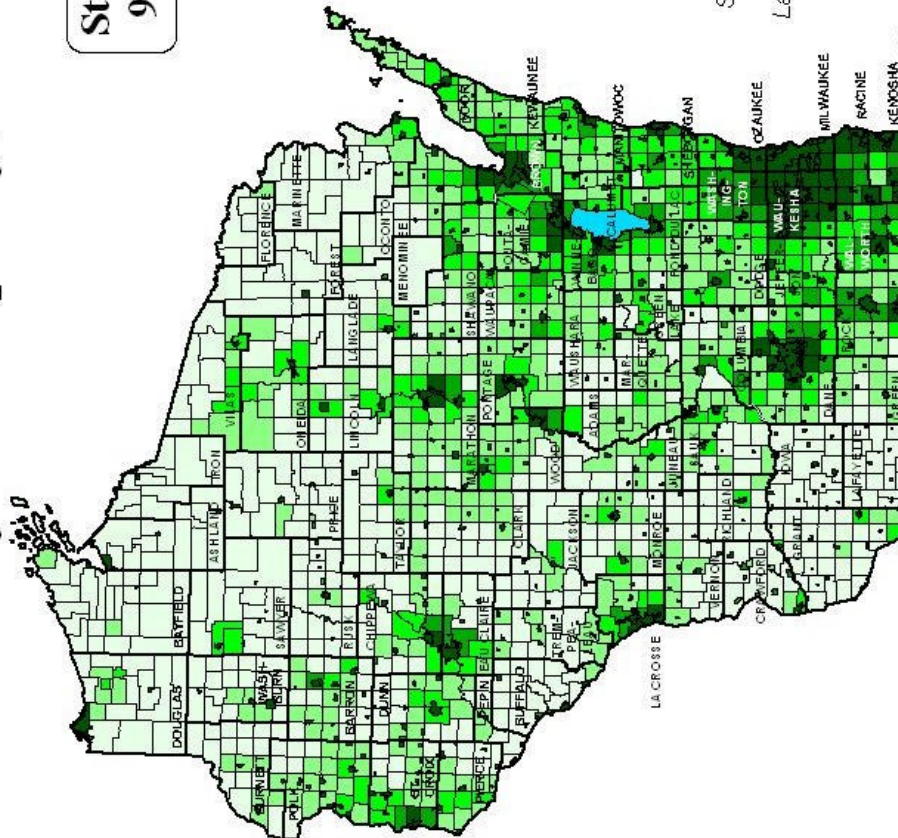
Density Per Square Mile
- Less than 20
- 20 - 40
- 40 - 80
- 80 - 160
- 160 or more

Sources of data: WI Demographic Services Center, January 2000 Population Estimates; WI Office of Land Information Services, 1998 Land Area by MCD

Map prepared by WI Demographic Services Center, October 2000

Figure 2

4.1.1.1.2.Ground teams perform interviewing in this first area until at least 30 "good" interviews have been completed. A "good" interview is one in which the interviewee was in a position to have seen or heard the missing aircraft at a time when the aircraft would have been passing the interviewee; the interviewee is judged reliable; and information obtained from the interviewee was not tainted by information from other sources. For best results, ground teams should begin interviewing along the flight path and work out to either side until they reach the limit of the area.

4.1.1.1.3.If teams find cross checked leads in the first interviewing area, the search manager defines a similar zone halfway between the midpoint and the PFL and assigns teams to interview there. This is interviewing area 2 in figure 1. If no leads were found in the first interviewing area (making it a "null zone"), the manager would place the next zone halfway between the LKP and the midpoint.

4.1.1.1.4.If teams find cross checked leads in the second interviewing area, the search manager would select the next zone halfway between the previous area and the PFL. If no leads are found the manager defines the next area halfway between the previous area and the midpoint. This is interviewing area 3 in figure 1.

4.1.1.1.5.The search manager continues in this fashion until the distance between an area containing leads and one containing no leads is less than 15 nautical miles. The search manager then attempts to establish a lead line by assigning interviewing from the last cross checked lead toward the last null interviewing zone.

4.1.1.1.6.Although a large amount of data is yet to be collected, the rule of halves strategy appears to reduce the primary search area down to about 450 square miles with a confidence of about 75 per cent.

4.1.1.2. Intensive Search Stage.

4.1.1.2.1. Although interviewing continues throughout this stage, the search manager will often find it effective to assign ground teams to areas outside of rule-of-halves-based interviewing zones so they can quickly verify sightings reported by search aircraft. In this instance some ground teams would still perform interviewing in the rule-of-halves zones, while others would interview in areas outside of these zones but within a relatively short driving distance of searching aircraft.

4.1.1.2.2. When reliable National Track Analysis Program (NTAP) data becomes available, the search manager may elect to assign ground teams to perform ground visual search in the area between the last NTAP datum and the point where the next two to three radar data should have painted. This is especially effective when the NTAP points lie in heavy ground cover.

4.1.2. Type II Missing Aircraft Search. Although Type II search areas are typically less than 150 square nautical miles, this is still too large an area to ground search. Ground teams can be effectively used, however, to search areas along the route of flight that are densely wooded or otherwise difficult to search from the air.

4.1.2.1. Initial Search Stage. As with Type I searches, ground teams may be used for interviewing. Interviewing typically starts at the route of flight midpoint and extends to five nautical miles to either side of the route. As mentioned above, ground teams may also be assigned to search areas with heavy ground cover that lie within five nautical miles of the route of flight.

4.1.2.2. Intensive Search Stage. In this stage grounds generally do not perform interviewing for Type II searches. Teams do perform the same visual searches as in the Initial Search Stage as well as dense terrain searches in the 15 nautical mile overfly zone. Grounds teams also verify aerial sightings.

4.1.3. Throughout the Search Phase, ground teams should monitor the appropriate ELT frequency and be prepared to locate an electronic target.

4.2.   Rescue and Recovery Phase. Often a CAP ground team is the first SAR asset at the crash site. Normally, the ground team leader assumes the role of CAP On Scene Commander (OSC) until relieved or until the site is handed over to civil authorities. If warranted, the search manager may assign a more senior ground team leader or member of the Command Post staff to assume OSC duties. The CAP ground team still performs all stabilization, security, treatment, and documentation tasks for which they are trained and which are consistent with local policy and law. The ground team will not normally perform occupant evacuation.

4.3.   Post-Recovery Phase. After occupant recovery, the ground team leader/OSC completes all CAP documentation and hands over the site to civil authorities. The ground team should not remain on scene very long after occupant recovery and not at all after scene hand off. After appropriate sortie and critical incident debriefings, ground teams demobilize according to the incident demobilization plan.

5.   Conclusion
The CAP ground team is a powerful information gathering and searching resource. By properly matching the assignments given to ground teams to the type and phase/stage of a missing aircraft search and rescue mission the search manager can greatly improve the chance of rapid mission success.